AMENDMENTS TO THE SPECIFICATION

Please insert the following paragraphs after the first paragraph of page 9 of the

publication of the parent PCT application, at line 6, just before the heading "BRIEF

DESCRIPTION OF THE DRAWINGS":

According to another broad aspect, there is provided a method for reconstructing a

surface from at least one arbitrary three-dimensional entity obtained from a target

surface. The method comprises: obtaining a set of at least one three-dimensional entity

and a position for the at least one entity in a common three-dimensional coordinate

system, each entity being a set of three-dimensional points, each said point containing

at least the three-dimensional coordinates of said point on the target surface, wherein

the entity is one of an unorganized cloud, a three-dimensional curve and a range image;

constructing a volumetric implicit representation of the target surface in the form of a

vector field using said set, each vector in the vector field containing at least the distance

to the target surface and the direction toward the target surface; and reconstructing the

target surface from the information contained in the vector field.

According to another broad aspect, there is provided a method for refining an alignment

of arbitrary three-dimensional entities obtained from a target surface. The method

comprises:

(a) obtaining a set of at least two three-dimensional entities and a position for the

at least two entities in a common three dimensional coordinate system, each

entity being a set of three-dimensional points, each said point containing at least

the three-dimensional coordinates of said point on the target surface, wherein

each entity is one of an unorganized cloud, a three-dimensional curve and a

range image;

(b) constructing a volumetric implicit representation of the target surface in the

form of a vector field using a subset of at least one entity of said set, each vector

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in the vector field containing at least the distance to the target surface and the direction toward the target surface;

- (c) selecting at least one obtained entity;
- (d) obtaining a subset of said points on each of the selected entities, points in these subsets being called control points;
- (e) for each control point in each selected entity, computing a contribution to a cost function, the contribution being a function of at least the vector field and the coordinate of the control point;
- (f) for each selected entity, computing a new position that optimizes its corresponding cost function; and
- (g) placing each selected entity in the vector field at its newly computed position and updating the vector field accordingly.

According to another broad aspect, there is provided a system for reconstructing a surface from at least one arbitrary three-dimensional entity obtained from a target surface comprising: a three-dimensional entity provider for obtaining a set of at least one three-dimensional entity and a position for the at least one entity in a common three-dimensional coordinate system, each entity being a set of three-dimensional points, each point containing at least the three-dimensional coordinates of said point on the target surface, wherein the entity is one of an unorganized cloud, a threedimensional curve and a range image; an implicit representation constructor for constructing a volumetric implicit representation of the target surface in the form of a vector field using said set, each vector in the vector field containing at least the distance to the target surface and the direction toward the target surface; and a target surface reconstructor for reconstructing the target surface from the information contained in the vector field.

According to another broad aspect, there is provided a system for refining an alignment of arbitrary three-dimensional entities obtained from a target surface, comprising: a Serial No. 10/560,130

three-dimensional entity provider for obtaining a set of at least two three-dimensional entities and a position for the at least two entities in a common three-dimensional coordinate system, each entity being a set of three-dimensional points, each point containing at least the three-dimensional coordinates of said point on the target surface, wherein each entity is one of an unorganized cloud, a three-dimensional curve and a range image; an implicit representation constructor for constructing a volumetric implicit representation of the target surface in the form of a vector field using said set, each vector in the vector field containing at least the distance to the target surface and the direction toward the target surface; and a control point selector for selecting at least one entity used in the vector field; a subset provider for obtaining a subset of points on each of the selected entities, points in these subsets being called control points; a cost function calculator for computing, for each control point in each selected entity, a contribution to a cost function, the contribution being a function of at least the vector field and the coordinate of the control point; a new position calculator for computing, for each selected entity, a new position that optimizes its corresponding cost function; wherein the implicit representation constructor places each selected entity in the vector field at its newly computed position and updates the vector field accordingly.